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**Abstract**

# KINETICS OF THE HOMOGENEOUS AND HETEROGENEOUS OXIDATION OF URANIUM (IV) AND ITS ACID LEACHING PROCESSES

E.A. Kanevsky, I.A. Yakubovich et al.

The comparison of the standard potentials of oxidation reduction processes with the uranium (IV) oxidizing rate by the different oxidizers in the acid solution shows that kinetic factors are the most important. In the absence of oxidizers the dissolving $UO_2$ cannot be practically observed and when the oxidizer is present the dissolving rate coincides with the oxidizing one.

The kinetics of the oxidation of uranium dioxide by manganous dioxide in the sulfuric acid solution is mainly determined by the conditions of the contact of the solid phases. In the case of the introduction Fe(III) ions they function as the direct oxidizers in spite of lower oxidation-reduction potential of this system.

The investigation of the process of oxidation of $UO_2$ by Fe(III) ions shows the high effectivity of hydrolyzed ions $FeOY^{2+}$ and $Fe(OH)_2^+$.

It has been established that the reaction is of first order with respect to Fe(III) and the disproportioning rate of U(V) in the sulfuric acid solution is higher than the oxidation rate $UO_2$ by hydrolyzed ions Fe (III). Among these ions $Fe(OH)_2^+$ is the most active.

In the presence $HNO_3$ the kinetics of the oxidation and the dissolving of $UO_2$ is determined by the rate of destruction of $HNO_3$ and the presence of the Fe(III) ions does not have such importance as in the system $UO_2$-$MnO_2$-Fe (III). At the low temperature Fe(III) ions do not accelerate the process. The causes of this effect have been discussed.

The investigation of kinetics of the oxidation of U(IV) in solution by the chlorites shows that in this reaction the active part of oxidizer are

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the products of destruction of chlorites. The rate of the interaction $UO_2$ with the chlorates in the acid solution is determined by the concentration of undissociated chloric acid.

The explanation of the slow proceeding of the reaction at the low temperature is given. The catalytic influence of the iron and vanadium ions on this process has been investigated.

The importance of these conclusions for the understanding of kinetics of the acid leaching of uranium from the ores has been discussed.